

REMARKS/ARGUMENTS

The applicants thank the Examiner for his Office Action mailed September 28, 2004. Claims 1, 5, 18, and 20 have been cancelled in this paper. Claims 2-4, 12, 13, and 16 have been amended and are discussed further herein. Moreover, Claims 22, 23, & 24 have been added to more clearly capture certain allowable subject matter. Thus, **Claims 2-4, 6-17, 19, and 21-24** are currently pending in the application. No new matter has been introduced. Reconsideration and allowance are hereby requested.

Objections to the Claims

Claim 13 was objected to as being indefinite. The applicant has amended this claim to more fully express the purpose of the claimed etching operation. As currently amended, Claim 13 now includes the limitation of “etching dielectric matrix film to selectively remove a portion ~~[[majority]]~~ of the dielectric film matrix leaving a cross-linked structure comprising the reinforcing material”. Thus, the claim is not simply a standard etch process as is known in the art. The patentability of this claim will be discussed in more detail below.

Also, **Claims 4, 10, 11, 14, and 15** are deemed patentable by the Examiner but dependent upon a rejected base claim. As yet, these claims are not amended due to the perceived patentability of Claim 2 over the cited references. This will also be discussed below.

Rejections Under 35 U.S.C. § 102

Claims 18-21 have been rejected under 35 U. S. C. §§ 102(e) as being unpatentable over *Sun et al.* (US Pat Publ US 2003/0047541 A1).

In response to this rejection **Claims 18 and 20 are cancelled and Claim 19 is amended** (although the claim merely incorporates the base claim). **Claim 21** remains unamended and is discussed more fully below.

Although, *Sun* superficially resembles the claimed invention, it is distinctly different from the present invention. As to **Claim 19**, the Office Action offers that *Sun* (at paragraph [0033]) teaches whisker materials selected from among “SiC, Si₃N₄, oxides, polymers, and diamond structured materials”. This is simply not the case. There is no teaching of any of these materials in *Sun*. If such materials are present in *Sun*, the applicant’s representative kindly asks the Examiner to direct him to the applicable portion of the Specification wherein such materials are listed. Also, as to **Claim 21**, *Sun* also does not teach a “dielectric composite film ... wherein

the whiskers occupy a volume in the matrix in the range of 0.1 to 10%.” If such volume density teachings are present in *Sun*, the applicants representative kindly asks the Examiner to direct him to the applicable portion of the Specification. There is no teaching of either of these key issues in the cited art. Accordingly, it is respectfully submitted that the cited art has failed to anticipate the claimed invention. Accordingly, the applicants respectfully submit that the cited art fails to teach all the claim limitations. Therefore, applicants respectfully request that this rejection be withdrawn as to **Claims 19 and 21**.

Moreover, **Claim 22** has been added to depend from Claim 19. The whiskers of Claim 22 comprise “rod shaped whiskers having a length of in the range of about 1 to about 50 nanometers and a cross-section of on the order of about 0.1 to about 5 nanometers”. Such whiskers are thousands of times smaller than anything conceived of in the cited art and are distinct from the teachings of the cited art. Thus, it is respectfully submitted that this Claim is allowable.

Rejections Under 35 U.S.C. § 103

Claims 1-3, 5-9, 13, 16 and 17:

Claims 1-3, 5-9, 13, 16 and 17 have been rejected under 35 U. S. C. § 103(a) as being unpatentable over *Woo et al.* (USPN 6,531,777), in view of *Sun*. The applicants point out that each of these references are confined to rather large fibers on the order of 1 to 10 μm (See, for example, *Sun* at paragraph [0033]). These fibers are huge relative to the nanostructure whiskers taught by the present invention.

Claims 1 and 5 are cancelled making this ground of rejection moot as to these claims.

Claims 2, 3, 13, and 16 are amended. For example, **Claim 2** has been amended to more clearly point out certain patentable features contained in both Claims 1 & 2. As now amended, Claim 2 claims a method of forming a circuit that includes “**distributing a reinforcing material comprising nanostructure whiskers throughout the dielectric matrix film to form the dielectric composite film.**” The cited art does not teach such “nanostructure whiskers”. As explained in the applicants Specification (e.g., at page 9:line 10-15, also at page 14, and at numerous other places) nanostructure materials are incredibly small, on the order of 1 to 100 nanometers long. This is 1,000 to 10,000 times smaller than anything even hinted at by the cited art (e.g., *Sun* at ¶[0033]). Accordingly, the applicants respectfully submit that the cited art simply does not teach “nanostructure whiskers” and therefore does not teach all of the limitations of the present invention. Consequently, the cited references fail to establish a *prima facie* case of obviousness as to at least rejected Claim 2.

For at least this reason, the cited combination of references has failed to establish a *prima facie* case of obviousness as to dependent Claims 3, 6-9, 13, 16, and 17 (all of which depend from Claim 2).

Additionally, these claims are allowable for other reasons which need not be discussed at this time. However, in one example, **Claim 13** is further allowable because it includes the additional limitation of “etching dielectric matrix film to selectively remove a portion ~~[[majority]]~~ of the dielectric film matrix leaving a cross-linked structure comprising the reinforcing material”. There is no teaching or suggestion of this limitation in the cited art. Accordingly, it is respectfully submitted that the pending rejections of **Claims 1-3, 5-9, 13, 16 and 17** be withdrawn and that these claims be allowed to issue.

Claims 4, 10, 11, 14, 15:

Additionally, **Claims 4, 10, 11, 14, and 15** also depend from Claim 2. Therefore, for at least the reasons advanced in support of Claim 2, these claims should also be allowed. To the extent these claims at some future time require amendment, applicants will do so as necessary. Accordingly, it is respectfully submitted that the pending rejections of **Claims 4, 10, 11, 14, and 15** be withdrawn and that these claims be allowed to issue.

Claim 12:

Claim 12 has been rejected under 35 U. S. C. § 103(a) as being unpatentable over *Woo et al.* (USPN 6,531,777), in view of *Sun*, and further in view of *Grill et al.* (USPN 6,030,904). **Claim 12** has been amended to depend from Claim 2. Consequently, for at least the reasons advanced in support of Claim 2, Claim 12 should be allowed. Further argument in support of Claim 12 is not deemed necessary at this time. Accordingly, it is respectfully submitted that the pending rejections of **Claim 12** be withdrawn and that these claims be allowed to issue.

Additional New Claims:

Claims 22-24 have been added to the application. **Claim 22** claims a dielectric composite film “wherein the whiskers comprise rod shaped whiskers having a length of in the range of about 1 to about 50 nanometers and a cross-section of on the order of about 0.1 to about 5 nanometers”. Support for this claim is found throughout the specification (e.g., 14:14-22) and it is believed to be patentable for reasons express above. Notably, these small fibers are several orders of magnitude small than anything hinted at in the cited art. Thus, nothing in any of the

cited references teach these cited limitations. Accordingly, it is respectfully submitted that this claim is allowable.

Claim 23 incorporates many of the limitations of Claims 1 and 4 and for has already been deemed allowable by the Examiner. Accordingly, it is respectfully submitted that claim 23 is in condition for allowance.

Claim 24 incorporates many of the limitations of Claims 1 and 12 including "heating the dielectric matrix film to vaporize volatile components thereby increasing the porosity of the dielectric matrix film to lower the k value of the dielectric matrix film". This clarifies the functional aspects of the heating of the substrate to remove volatile materials to generate a suitable low-k matrix. No such teaching is offered or suggested by the cited references, or any reasonable combination thereof. Accordingly, it is respectfully submitted that this claim is allowable.

Conclusion:

In view of the foregoing amendments and remarks, it is respectfully submitted that the claimed invention as presently presented is patentable over the art of record and that this case is now in condition for allowance.

Should the Examiner, for any reason, wish to contact the undersigned, he is cordially invited to do so at his convenience. Moreover, if the Examiner has any continuing concerns regarding this case, he is invited to contact the undersigned at (650) 961-8300.

Respectfully submitted,

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